

CHAPTER V

GEOLOGY AND SUBSIDENCE

PARTS

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File in:

☐ Confidential

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☒ Expandable

Refer to Record No. 0071 Date 11/9/2008/0002

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For additional information

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The mining method used in most of the mine is room and pillar with partial pillar removal. Full extraction mining (planned subsidence) ~~is will occur~~^{proposed} at Emery in areas designated ~~as~~ full extraction as noted on Plate V-5. As a result, any subsidence outside of these areas would fall into the unplanned category. Figure 1 pg. 28 shows the partial pillar splitting diagram employed underground. This layout is the result of past experience as well as state and federal regulations pertaining to roof control and ventilation. All pillar splitting will be approved by MSHA. A pillar split diagram specific to full extraction is provided in Figure 2 (page 29).

Maximum subsidence at the Emery Mine will be approximately 50% of the extraction height. Given the current mining horizon this would relate to 3 feet of subsidence in areas of 6 foot extraction to 5 feet of subsidence in areas of 10 foot extraction. The predicted angle of draw will range from approximately 5 degrees at 150 feet of cover, 12 degrees at 350 feet of cover and 15 degrees at 750 feet of cover or greater. Please refer to Plate V-5 (Subsidence Monitoring Points and Buffer Zones) for estimated subsidence isopachs.

Consol intends to prevent subsidence from affecting Quitchupah Creek, Christiansen Wash and the alluvial valley floor area on the west side of the permit area (Refer to Plate V-5). There will be no full extraction within the designated buffer zones. An intermittently occupied dwelling in Section 30 will also be protected from subsidence. As of the date of this writing, a subsidence waiver has not been obtained on this dwelling. At such time as a waiver is obtained, the Division shall be notified and the buffer around this dwelling will be removed. Other than these features, the presubsidence survey, and our knowledge of the permit area confirms that there aren't any structures overlying present or future underground workings for which mitigation of subsidence effects would be overly difficult.

The three above noted features will be protected by establishing buffer zones which in turn are created by leaving coal pillars of adequate size beneath these areas. The dimensions of the buffer zone will be determined by the overburden depth and the angle of draw. With respect to Quitchupah Creek and Christiansen Wash, the buffer zone will include an additional standoff distance of 100 ft. on either side, as required by UMC 817.57. The pillar dimensions are based on established geotechnical information and a factor of safety for long term pillar stability. The partial pillar splitting design data can be found at CH V Page 28a, 28b, and 28c. A pillar split plan sketch can be found at CH V Page 28 and Figure V-1 on CH V Page 28d. As can be seen from the following design data this partial pillar splitting plan will not result in subsidence, and is considered unplanned subsidence per the MRP.

Replaced 12/04
Revised 1/05
Revised 8/05
Revised 2/07
Revised 9/08

2. The effect of the weather on mitigation plans - In some cases, it may be practical to perform repair work in the winter or spring while in other cases it would not. For instance, it would probably not be practical to repair a road embankment, where compaction is critical, during winter weather. However it may be practical to repair a fence. Another example would be if it was necessary to remove and stockpile topsoil to perform mitigation work. It would be better to perform the work in the summer when the soil could be properly segregated than to try to do the work in the spring when conditions are normally muddy.
3. The effects of mitigation work on non-renewable resources -The best example of this situation is the case where it is necessary to regrade an area to mitigate the effects of subsidence. If it is necessary to remove the topsoil prior to regrading, it would be better to wait until all probable subsidence had occurred than to risk topsoil contamination through repeated removal and respreading of the topsoil should subsidence continue for several years. However in this case, it may be necessary to perform lesser or temporary mitigative work to minimize the effects of pending water on the soil resources or hazardous conditions for people, wildlife or livestock.

As discussed above, we do not believe it is possible to commit to a specific timetable for performing subsidence mitigation. However, when subsidence mitigation is required by applicable laws and regulations, mitigation will be performed as soon as practical taking into consideration the above items.

UMC 817.126

As described in the subsidence control plan, under UMC 784.20, the two (2) perennial streams in the permit area will be protected by buffer zones (Refer to Plate V-5). There are no impoundments of 20 acre-feet or more in the permit area.

Underground water rights described in Chapter VI, under UMC 784.14, show that the Town of Emery maintains two (2) wells developed in different aquifers within the Ferron Sandstone formation. These wells are used as a backup water source to the town's present water supply system which relies on surface water from Muddy Creek. Emery Town Well No. 1 is developed in the Lower Ferron aquifer, which lies well below current mining activities. Well No. 2 is developed in the Middle and Upper Ferron aquifers which are directly below and above the seam being mined. No adverse impacts to either well are anticipated since the wells are located about 3 to 4 miles from the mine and are up gradient within the regional ground water flow pattern. If it is proven that mining activities adversely impact the Emery Town Wells and the town's surface water system becomes inoperable, Consol commits to providing an alternative source of water, per R645-301-731-530. If the town of Emery surface water system becomes inoperable and the backup wells are needed, Consol will replace the water that was adversely impacted by mining. Consol will commit to hauling water to the Emery treatment facility until the town's surface system becomes operable, an alternative source is secured, or the aquifer recharges as outlined in the hydrologic model. Static water level readings taken from wells maintained as part of the mine's ground water monitoring program also indicate that no disruption of the aquifers in the vicinity of the town's wells has occurred.

Underground operations at the Emery Mine are not conducted beneath or in close proximity to any public buildings, including churches, schools, hospitals, court houses, and government offices.

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APPENDIX V-7

2008 PRE-SUBSIDENCE SURVEY
LIFE OF MINE PANELS

**Pre-subsidence Survey
Prior to Full Extraction at Panels
1 – 4 North,
1 – 5 and 7 – 13 West,
8 South, and
5 West Mains**

Emery Mine
Consolidation Coal Company
Emery County, Utah

June 2008



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SECTION 1

INTRODUCTION

The purpose of this report is to present baseline surface conditions prior to full extraction operations at several panels in the Consolidation Coal Company (CONSOL) Emery Mine, Emery County, Utah. The panels covered in this report include the following:

- Panels 1 through 5 West,
- Panels 7 through 13 West,
- Panels 1 through 4 North,
- Panel 8 South,
- The 5th West Mains, and
- The area between Panels 1 West, 2 North, and the Permit Boundary.

Two previous presubsidence surveys covering the 14th and 15th West Panels and the Zero North, 4th East, and 6th West Panels have already been performed and submitted in Spring 2007 and Fall 2007, respectively. This document covers the remaining area scheduled to undergo full extraction within the current permit boundary.

This document is intended to be part of a Subsidence Control Plan as required in Section R645-301-525.100 of the Utah Administrative Code. Recording initial surface conditions will facilitate locating and mitigating any areas determined to be adversely affected by future subsidence. As part of the pre-subsidence survey, the locations and conditions of the following features were recorded:

- Structures (e.g. buildings, corrals, roads)
- Fences
- Utilities (e.g. power, telephone, gas, and water lines, water wells)
- Surface drainages (e.g. natural channels, irrigation ditches)

This report references the original Pre-subsidence Survey performed prior to mining operations in 1980 (Valley Engineering, 1980). The feature numbers given in this document correspond to those described in the 1980 report. These features were surveyed in the field in spring 2008, and any differences and/or changes from the conditions noted during the 1980 survey are noted both in the text and figures of this document. This report supercedes the Valley Engineering survey where conflicts exist.

CHAPTER 2

SURVEY AREA OBSERVATIONS

2.1 GENERAL AREA DESCRIPTION

This pre-subsidence survey covers approximately 1,475 acres of primarily undeveloped land with approximately 320 acres of irrigated fields and grazing pastures. The ground surface is generally flat with some small, steep hills formed by eroded washes and resistant bedrock outcrops. A perennial stream named Christiansen Wash runs through the center of the survey area and drains in a general southeasterly direction. This stream is used both to supply irrigation water and to receive irrigation returns for surrounding agricultural land via a complex network of irrigation ditches, piping, and storage ponds. Structures within the survey area include one barn which is in fair condition and several corrals and sheds that are in fair to dilapidated condition. Nearly all of the structures are built from unfinished and/or rough cut timbers and appear to have been present for several decades. A large corrugated metal shed, however, which is located north of the 4th West Panel, has been constructed within the last few years and is in excellent condition. There are several fences in the area in various states of repair. Most of the fences are constructed with barbed wire strung between posts made from natural rough cut tree limbs. Some fences use finished lumber fence posts or metal tee-stakes and tubing. There are two paved roads, two gravel-surfaced roads, and several unimproved dirt roads in the survey area. The paved and gravel-surfaced roads are in good condition, and the dirt roads range from good to poor condition.

Utilities within the survey area include overhead power lines and a buried water line. All of the features (structures, fences, roads, drainages, utilities, etc.) located during the pre-subsidence survey are shown on Figure 1. CONSOL has signed a County Road Repair Agreement with Emery County to mitigate any subsidence damage to roads within the full extraction area. Similarly, CONSOL has entered into a Power Line Repair Agreement with

Pacificorp to mitigate subsidence damage to power lines within the full extraction area. An emergency shutoff valve has been installed on the buried water line just north of where subsidence is expected to occur. A buried fiber optic cable formerly located in the full-extraction area has been relocated to the west.

2.2 INDIVIDUAL FEATURE DESCRIPTIONS

Each numbered feature on Figure 1 within the survey area is described below. The numbers for each feature are identical to those used in the 1980 Pre-Subsidence Survey. Refer to Section 6 for photographs. Features within the 14th/15th West, 0 North, 6th West, and 4th East Mains have already been surveyed and are described in reports submitted in Spring and Fall 2007.

Feature 72. Irrigation Ditch. This feature has been updated from the Valley Engineering (1980) report. This ditch has earthen banks, is approximately three feet deep, and ranges from five to eight feet wide. There was no water within the ditch when it was surveyed in May 2008, but moist soil in its bottom suggested that it had been used recently. Water within the ditch flows from west to east until it reaches the paved road. From this point, water is diverted to the south through a culvert under the gravel road, and then east again under the paved road.

Feature 73. Pond. This feature has been updated from the Valley Engineering (1980) report. The pond is approximately 100 feet in diameter and was partially full when it was surveyed in May 2008. An approximately 5-foot tall earthen embankment runs along its downstream edge.

Feature 74. Irrigation Ditch. This feature is essentially unchanged from how it is described in the Valley Engineering (1980) report, which states the following: "The earthen

bank ditch is approximately 1.5 feet to 2 feet wide and 1 foot to 1.5 feet deep. Vegetation is growing along its banks.”

Feature 85. Dirt Road and Fences. This feature is essentially unchanged from how it is described in the Valley Engineering (1980) report, which states the following: “The road is a two-track, single lane, dirt road. The road surface consists of the natural sand and clay that is in the area, and has been compacted by vehicles that travel the road. The fences in the area are barbed wire with either natural rough cut wood posts or steel posts.” The fences are in fair to good condition.

Feature 86. Barbed Wire Fence. This feature has been updated from the Valley Engineering (1980) report. The fence, which is constructed with rough cut timber posts, is in dilapidated condition. Several of the posts are missing, and many of the barbed wire strands are loose and partially buried under the ground surface.

Feature 87. Small Creek and Fence. The description of this feature has been updated from the Valley Engineering (1980) report. The fence is constructed of rough cut timber posts and barbed wire and is in good condition. The “small creek” was incorrectly identified in the 1980 survey. The survey area is relatively flat, dry, and contains no established stream channels. The 1980 survey shows several irrigation ditches overlying the Zero North Panel which drain toward this “stream channel,” which was actually an irrigation outflow ditch. During the 2007 survey, it was evident that many of the irrigation ditches had been allowed to fill in, including the “stream channel” identified in the 1980 survey.

Feature 89. Quarter Section Marker. This feature remains the same as described in the Valley Engineering (1980) report, which states the following: “This quarter section corner marker is in Range 6 East Township 22 South. It divides sections 22 and 27. The marker is a metal cap on a short steel pipe.”

Feature 90. Ponds. The description of this feature has been updated from the Valley Engineering (1980) report. The ponds were empty during an October 2007 survey, but four earth berms were present that appeared capable of impounding water. The berms are approximately 3 feet tall. Three of the berms are clustered together in a north to south alignment, and one berm is located a few hundred feet to the northeast. A dry irrigation ditch located west of the three clustered ponds appears to serve as a water source. A dilapidated wooden corral and small shed is located just north of the three clustered ponds.

Feature 93. Irrigation Ditches and Farmland. The description of this feature has been updated from the Valley Engineering (1980) report. It contains 4 irrigated fields that comprise a total of 48 acres of cultivated land. Irrigation water flows from northwest to southeast and is supplied by the ditch running along the gravel road located east of the field.

Feature 96. Cattle Guard. The description of this feature has been updated from the Valley Engineering (1980) report. The cattle guard was not present during the May 2008 survey.

Feature 97. Dirt Road, Utility Power Line, and Fence. The description of this feature has been updated from the Valley Engineering (1980) report. The dirt road is approximately 24 feet wide with a surface constructed from imported, compacted gravel. The road is in very good condition. The utility power line hangs from 30 to 40 foot tall wooden poles, and is in very good condition. The poles appear relatively plumb. The barbed wire fence is located on the west side of the road and has posts constructed from rough cut timbers and metal tee-stakes. The fence is in good to excellent condition.

Feature 98. Small Creek. The description of this feature has been updated from the Valley Engineering (1980) report. The creek is called Christiansen Wash. During the October 2007 survey, flow in the creek bed was approximately 3 feet wide. The creek flows to the

southwest and discharges into Quitchupah Creek. The creek flows under the paved access road for the 4th East Portal via a 60-inch diameter coated corrugated steel pipe that is in very good condition.

Feature 103. Farm Land, Corrals, Ponds, and Fences. The description of this feature has been updated from the Valley Engineering (1980) report. A fenced and gated hay storage area is located in the southeast corner of this feature. The fence and gate are in good condition. An unimproved dirt road (good condition) leads from the gravel road up to the hay storage area. Three small ponds are located north of the hay storage area. The two ponds that are adjacent to the hay storage area measure approximately 100 feet in diameter and are up to 5 feet deep. A larger pond measuring 400 feet by 200 feet is located about 700 feet to the northwest. Irrigated farm land and corrals surround the hay storage area. The corrals are constructed from metal tee stakes, finished and unfinished timbers, and metal tubing. They appear to be in good condition. The irrigated agricultural land consists of three fields totaling 70 acres. Irrigation is performed with a network of irrigation ditches that flow in a northwest to southeast direction as well as a buried plastic water line. The water line is 12" in diameter and runs north to south for 900 feet under the northwestern-most irrigated field of this feature. Two additional buried water lines are scheduled for construction during summer 2008. An unimproved dirt road in fair condition located about 800 feet north of the hay storage area provides additional access to the fields and corrals.

Feature 107. Corrals and Covered Shelters. The description of this feature has been updated from the Valley Engineering (1980) report. The corrals and shelters are in poor condition and are constructed of rough cut lumber and rough sawn boards. Several pieces of the fence are missing. The land slopes steeply downward just to the south of the corrals toward a broad, flat plain. During site reconnaissance, a marshy, grassy area was observed near the base of this slope. This marshy area corresponds to SP-9 on Plate VI-2/VI-2A and in the text of Chapter VI Volume 1 Section VI.A.2 (Springs and Seeps) of the Emery Mine Permit

(Consolidation Coal Company, 1990). As indicated in that permit document, SP-9 is the result of irrigation water and not a spring.

Feature 108. Corral. The description of this feature has been updated from the Valley Engineering (1980) report. This feature is in fair condition. It is constructed from square rough-cut wood posts, unfinished wood posts, and steel fencing reinforcement. Most of the corral is fenced with barbed wire. During site reconnaissance in May 2008, several hay bales were being stored in the corral, suggesting that it was being used

Feature 109. Farm Land. The description of this feature has been updated from the Valley Engineering (1980) report. This area is used primarily for growing alfalfa, but there are some grassland areas used for pasture. Irrigation water is conveyed to the area via a network of piping and ditches that drains to the southeast. There is one small pond that has been constructed at this feature.

Feature 110. Corrals, Sheds, Barn, Pond, and Farm Land. The description of this feature has been updated from the Valley Engineering (1980) report. The corrals are constructed of unfinished and rough cut timbers as well as steel pipe fencing and are in good to fair condition. The sheds are constructed from rough cut logs and rough sawn boards and are in dilapidated condition. The roofs of the sheds have largely fallen apart. The barn is a two-story wood frame building in fair condition. It is founded on stacked rocks, which have started to fall over on the east side of the building. The pond measures approximately 300 feet long by 100 feet wide and has an earthen embankment that is approximately 10 feet tall on its east side. Irrigated fields of hay and grass covering an area of approximately 80 acres are located to the east and southeast of the corrals, barn, and pond.

Feature 111. Gravel Road, Utility Power Lines, Telephone Lines, and Fence Lines. The description of this feature has been updated from the Valley Engineering (1980) report. The road

is surfaced with asphalt and is in good condition with few, if any cracks. An improved road surfaced with compacted gravel intersects the paved road from the west. The gravel road is in good condition. An overhead electric power line is located along the east side of the paved road and crosses over to run along the south side of the gravel road. Another overhead power line runs west to east along the north side of the gravel road, over the paved road, and across the adjacent pasture to the east. All of the power poles are in good condition, appear relatively plumb, and are about 40 feet tall. Orange markers that indicate the presence of a buried fiber optic cable are located along the north-south power pole alignment. Barbed wire fences run along both sides of the gravel and paved roads. The fences are in good to fair condition.

Feature 112. Corral. The description of this feature has been updated from the Valley Engineering (1980) report. This feature includes a corral, an animal shelter, remnants of a hay derrick, and two small ponds. The corral is constructed from rough-cut timbers, barbed wire, and conveyor belt material. It is in fair condition. The animal shelter is also constructed from rough-cut timber and is in dilapidated condition. Large sections of the roof are missing. The hay derrick is in fair to poor condition. The two ponds, which were empty during the Spring 2008 survey, are approximately 85 feet in diameter and have constructed with earthen embankments approximately 3 feet tall.

Feature 113. Corral. The description of this feature has been updated from the Valley Engineering (1980) report. The corral is constructed from both rough-cut timbers and painted metal tube fencing. The corral has been partitioned into several small areas. It is in good condition.

Feature 114. Corrals. The description of this feature has been updated from the Valley Engineering (1980) report. The corrals are constructed from rough-cut timbers which comprise the fence posts, fencing material, and sheltered areas. Hay was stored in one of the sheltered areas during the May 2008 survey. The corrals and shelters are in poor condition.

Feature 118. Section Corner Marker. This feature remains the same as described in the Valley Engineering (1980) report, which states the following: "This corner marker is located in Range 6 East Township 22 South. The marker is a metal cap on top of a short steel pipe. The marker is located at the intersection of Sections 20, 21, 28, and 29."

Feature 122. Irrigation Ditch. This feature was mapped but not enumerated in the Valley Engineering (1980) report. It consists of an irrigation ditch that conveys water from north to south along the west side of the road described in Feature 97, and then along the northwest edge of an irrigated field adjacent to the road. The ditch is approximately six inches deep and is in fair to good condition. Survey coordinates associated with this ditch are provided in Table 1.

Feature 123. Remnant Irrigation Ditch Segment. This feature was mapped but not enumerated in the Valley Engineering (1980) report. It consists of a segment of an irrigation ditch that has been allowed to fall into disrepair. The ditch contains a section of irrigation piping, and both the ditch and the piping have mostly filled in with sediment. Both the inflow and outflow to and from this ditch segment are completely filled in.

Feature 124. Shed. This feature was constructed after the Valley Engineering (1980) report was written. It is located about 1,000 feet north of the area scheduled for full extraction. The shed is built from corrugated metal with a concrete foundation and measures approximately 100 feet long by 40 feet wide by 30 feet tall. It is in excellent condition. A rock crusher is located adjacent to the shed on its northwest corner. An unimproved dirt road in fair condition leads from the graded gravel-surfaced road to the shed.

Feature 125. Water Line Manhole with Emergency Shutoff Valve. This feature was constructed after the Valley Engineering (1980) report was written. The manhole is constructed from concrete with an unlocked diamond plate steel trap door. Inside the manhole is an

emergency shutoff valve that has been installed on the water line. The valve is intended to stop the flow of water in the line in the event that subsidence causes the pipe to rupture. The water line lies approximately three feet below the ground surface. A covered water meter is located adjacent to the manhole.

SECTION 3

CONCLUSIONS

This report summarizes pre-subsidence surface conditions for the following areas at the Consolidation Coal Emery Mine, Emery County, Utah:

- Panels 1 through 5 West,
- Panels 7 through 13 West,
- Panels 1 through 4 North,
- Panel 8 South,
- The 5th West Mains, and
- The area between Panels 1 West, 2 North, and the Permit Boundary.

Surface features were inspected and surveyed in Spring 2008 prior to full extraction. Although the damage due to subsidence is generally expected to be limited, the greatest potential for adverse effects would likely be disturbances to surface drainages, ponds, roads, and utilities. By detailing pre-subsidence conditions in this report, it will be easier to both identify and mitigate negative impacts caused by future subsidence.

SECTION 4
REFERENCES

Consolidation Coal Company, 1990. Emery Mine Permit Act 015/015 Renewal. Chapter VI Volume 1 Section VI.A.3. Submitted to Division of Oil, Gas, and Mining September 9, 1990.

Valley Engineering, Inc., 1980. Consolidation Coal Company, Emery Mine, Presubsidence Survey, Structure and Renewable Resources Descriptions. Division of Oil, Gas, and Mining, Emery Permit 015/015. Chapter V, Vol. 2 of 3.

FIGURE 1

TABLE 1

GROUP F

5160	6761156.01	1708115.45	6151.31	TOP CMP
5161	6761156.25	1708115.58	6150.00	FL
5162	6761144.32	1708162.12	6151.07	TOP CMP
5163	6761144.30	1708162.58	6149.28	FL
5164	6761127.97	1708174.30	6149.06	FL
5165	6761123.40	1708237.48	6148.59	FL
5166	6761120.58	1708304.50	6149.04	FL
5167	6761118.39	1708432.46	6148.80	TOP
5168	6761122.58	1708432.86	6148.68	TOP
5169	6761119.82	1708433.39	6147.42	FL
5170	6761116.83	1708587.21	6145.61	FL
5171	6761114.18	1708724.05	6143.44	FL
5172	6761103.04	1708918.64	6138.30	FL
5173	6761098.01	1708932.20	6138.59	FL
5174	6761050.61	1708951.71	6136.77	FL
5175	6761027.88	1708960.34	6136.48	FL
5176	6760888.46	1709048.45	6135.38	FL
5177	6760787.36	1709100.73	6134.45	FL
5178	6760785.93	1709098.53	6136.22	TOP
5179	6760788.54	1709101.66	6135.90	TOP
5180	6760742.13	1709133.68	6134.71	FL
5181	6760721.93	1709180.62	6134.18	FL
5182	6760704.74	1709209.68	6133.63	FL
5183	6760634.31	1709263.86	6133.00	FL
5184	6760575.27	1709310.63	6132.73	FL
5185	6760461.75	1709376.76	6131.29	FL
5186	6760349.01	1709414.64	6130.70	FL
5187	6760316.73	1709424.80	6130.35	FL
5188	6760300.34	1709438.27	6131.65	TOP
5189	6760297.73	1709435.15	6131.64	TOP
5190	6760298.16	1709436.70	6130.71	FL
5191	6760260.18	1709485.42	6130.17	FL
5192	6760160.36	1709632.62	6129.53	FL
5193	6760107.69	1709658.28	6129.72	FL
5194	6759964.13	1709715.41	6128.61	FL
5195	6759939.97	1709728.45	6128.70	FL
5196	6759939.95	1709728.59	6130.56	TOP CMP
5197	6759926.17	1709739.39	6130.29	TOP CMP
5198	6759926.02	1709739.39	6129.06	FL

GROUP G

5199	6762316.32	1708478.14	6155.49	POND
5200	6762266.86	1708486.23	6156.32	POND
5201	6762235.61	1708500.46	6157.70	POND
5202	6762211.48	1708526.34	6157.09	POND
5203	6762194.68	1708548.76	6156.92	POND
5204	6762183.32	1708572.71	6156.20	POND

Consolidation Coal Company
Emery Mine

Spring 2008 Pre-Subsidence Survey
June 2008

5205	6762180.60	1708592.31	6154.10	POND
5206	6762119.71	1708616.99	6152.31	BC OFF
5207	6762135.94	1708635.63	6151.26	BC OFF
5208	6762132.81	1708655.15	6149.40	BC OFF
5209	6762113.19	1708671.21	6145.81	BC OFF
5210	6762083.95	1708666.62	6145.60	BC OFF
5211	6762065.27	1708646.24	6146.43	BC OFF
5212	6762068.26	1708627.38	6149.93	BC OFF
5213	6762091.23	1708612.81	6152.15	BC OFF
5214	6762205.68	1708630.96	6152.25	POND
5215	6762237.92	1708636.13	6152.00	POND
5216	6762275.76	1708629.69	6151.17	POND
5217	6762307.22	1708630.80	6153.73	POND
5218	6762332.69	1708645.56	6156.27	POND
5219	6762409.22	1708643.99	6156.49	POND
5220	6762468.93	1708631.89	6155.89	POND
5221	6762501.98	1708618.74	6155.02	POND
5222	6762519.56	1708589.91	6155.36	POND
5223	6762526.12	1708563.11	6156.09	POND
5224	6762527.66	1708541.93	6154.67	POND
5225	6762523.27	1708527.52	6151.78	POND
5226	6762514.11	1708507.13	6152.10	POND
5227	6762491.13	1708492.51	6152.71	POND
5228	6762440.69	1708485.82	6152.63	POND
5229	6762418.90	1708482.95	6154.10	POND
5230	6762525.13	1708516.36	6148.49	FL
5231	6762589.83	1708521.22	6148.40	FL
5232	6762634.36	1708526.43	6148.71	FL
5233	6762634.79	1708526.04	6150.64	TOP PIPE
5234	6762647.56	1708523.73	6150.82	TOP PIPE
5235	6762647.78	1708523.45	6148.83	FL
5236	6762662.83	1708519.87	6148.98	FL
5237	6762667.51	1708527.58	6147.85	FL
5238	6762667.19	1708527.65	6150.14	TOP CMP
5239	6762663.24	1708520.17	6151.17	GATE
5240	6762673.20	1708504.28	6150.35	FL
5241	6762770.05	1708486.47	6150.57	FL
5242	6762863.64	1708459.10	6152.16	FL
5243	6762991.91	1708421.12	6152.87	FL
5244	6763033.52	1708350.31	6154.84	FL
5245	6763079.73	1708289.88	6155.94	FL
5246	6763142.86	1708284.10	6158.02	TOP
5247	6763142.69	1708273.93	6158.11	TOP
5248	6763141.96	1708277.87	6155.73	FL
5249	6763186.73	1708275.98	6156.01	FL
5250	6763203.46	1708262.51	6156.04	FL
5251	6763220.82	1708263.36	6156.43	FL
5252	6763252.06	1708258.83	6156.67	FL

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5253	6763273.02	1708254.50	6159.26	FL
5254	6763271.62	1708253.30	6157.44	FL
5255	6763271.03	1708252.40	6160.12	TOP CMP
5256	6763271.13	1708212.83	6160.42	TOP CMP
5257	6763270.75	1708212.21	6157.99	FL
5258	6762685.35	1708564.80	6147.45	FL
5259	6762663.83	1708650.00	6144.65	FL
5260	6762649.04	1708727.82	6143.63	FL
5261	6762567.24	1708883.65	6143.11	FL
5262	6762556.44	1708900.07	6142.54	FL
5263	6762542.65	1708907.05	6142.08	FL
5264	6762388.58	1708741.49	6142.41	FL
5265	6762419.30	1708768.07	6142.29	FL
5266	6762424.34	1708793.51	6141.92	FL
5267	6762422.43	1708794.45	6142.31	TOP
5268	6762425.48	1708792.88	6142.55	TOP
5269	6762467.50	1708871.38	6140.81	FL
5270	6762508.96	1708961.58	6140.43	FL
5271	6762535.63	1709041.03	6139.87	FL
5272	6762560.41	1709146.05	6138.58	FL Y
5273	6762587.50	1709113.06	6138.84	FL
5274	6762540.29	1709176.96	6137.64	FL
5275	6762535.60	1709179.04	6138.50	TOP
5276	6762538.93	1709181.80	6138.35	TOP
5277	6762537.99	1709180.26	6137.60	FL
5278	6762424.50	1709325.32	6134.76	FL
5279	6762413.63	1709326.32	6134.90	FL CONT
5280	6762418.01	1709335.02	6134.44	FL
5281	6762297.45	1709489.17	6131.16	FL
5282	6762204.01	1709611.77	6128.72	FL
5283	6762147.35	1709685.26	6127.53	FL Y
5284	6762139.18	1709683.55	6127.75	FL CONT
5285	6762140.95	1709693.21	6127.25	FL
5286	6762039.14	1709820.66	6125.23	TOP
5287	6762041.59	1709823.05	6125.32	TOP
5288	6762040.55	1709821.87	6124.61	FL
5289	6761926.83	1709970.51	6122.38	FL
5290	6761899.53	1710007.93	6121.82	FL Y
5291	6761886.79	1710013.58	6122.05	FL CONT
5292	6761885.74	1710030.46	6121.37	FL
5293	6761860.19	1710062.30	6120.93	FL Y
5294	6761842.89	1710069.99	6120.86	FL CONT
5295	6761831.42	1710103.46	6119.69	FL
5296	6761752.68	1710204.00	6119.10	FL
5297	6761722.02	1710242.96	6118.27	FL Y
5298	6761707.35	1710246.61	6118.32	FL CONT
5299	6761708.29	1710260.99	6117.35	FL
5300	6761631.84	1710357.48	6116.49	TOP

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5301	6761632.96	1710359.09	6115.54	FL
5302	6761634.69	1710361.13	6116.47	TOP
5303	6761593.79	1710409.04	6114.77	FL
5304	6761593.68	1710409.06	6114.83	FL Y
5305	6761579.89	1710407.93	6115.01	FL CONT
5306	6761583.01	1710422.60	6114.49	FL
5307	6761518.26	1710504.75	6113.42	FL Y
5308	6761506.60	1710505.30	6113.63	FL CONT
5309	6761512.07	1710513.33	6113.15	FL
5310	6761447.00	1710597.67	6111.63	FL
5311	6761416.44	1710636.70	6110.68	FL Y
5312	6761408.15	1710634.37	6110.90	FL CONT
5313	6761408.72	1710647.19	6110.43	FL
5314	6761288.07	1710802.03	6107.54	FL
5315	6761213.16	1710898.98	6106.06	FL
5316	6761164.89	1710970.14	6106.27	FC
5317	6761171.36	1710962.06	6106.16	FNC
5318	6761147.58	1710967.65	6106.08	FNC
5319	6760527.39	1710945.82	6102.34	FL END
5320	6760537.40	1710921.57	6103.35	TOP
5321	6760536.37	1710920.87	6103.89	TOP
5322	6760536.24	1710920.81	6102.69	FL
5323	6760598.58	1710831.91	6103.50	FL
5324	6760653.83	1710757.39	6104.59	FL
5325	6760727.66	1710664.38	6106.17	FL
5326	6760727.09	1710663.52	6106.76	TOP
5327	6760729.02	1710665.52	6106.82	TOP
5328	6760822.61	1710538.91	6108.45	FL
5329	6760934.50	1710386.07	6111.91	FL
5330	6761027.15	1710256.21	6114.39	TOP
5331	6761029.05	1710257.73	6114.44	TOP
5332	6761028.48	1710256.66	6113.80	FL
5333	6761222.20	1709987.08	6118.31	FL Y
5334	6761232.02	1709989.83	6118.41	FL CONT
5335	6761231.43	1709972.86	6118.46	FL
5336	6761325.34	1709847.42	6119.96	FL
5337	6761392.69	1709757.51	6122.19	FL INT
5338	6761381.90	1709750.62	6121.50	FL CONT
5339	6761397.97	1709750.84	6121.96	FL INT
5340	6761388.33	1709745.75	6121.84	FL CONT
5341	6761402.72	1709743.45	6122.11	FL
5342	6761483.00	1709637.03	6124.43	TOP
5343	6761481.31	1709636.72	6124.75	TOP
5344	6761482.08	1709636.28	6123.28	FL
5345	6761588.09	1709494.56	6126.00	FL
5346	6761674.10	1709379.14	6127.31	FL
5347	6761798.10	1709213.05	6129.68	FL
5348	6761892.62	1709086.20	6131.72	FL

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5349	6762015.52	1708921.32	6134.07	FL
5350	6762016.72	1708922.19	6135.00	TOP
5351	6762013.69	1708919.69	6135.20	TOP
5352	6762117.08	1708785.22	6137.87	FL
5353	6762143.70	1708750.40	6139.98	FL
5354	6762146.35	1708736.44	6140.34	FL INT
5355	6762144.87	1708730.07	6140.26	FL
5356	6762144.89	1708729.89	6141.57	TOP PVC
5357	6762142.77	1708716.74	6141.86	TOP PVC
5358	6762142.48	1708716.83	6140.84	FL
5359	6762285.70	1708645.90	6143.44	FL
5360	6762284.75	1708662.74	6143.92	FL
5361	6762279.28	1708673.31	6143.46	FL
5362	6762271.98	1708680.58	6143.03	FL
5363	6762272.75	1708690.84	6141.97	FL
5364	6762284.25	1708688.53	6143.31	FL
5365	6762307.43	1708686.88	6142.33	FL
5366	6762307.71	1708686.73	6144.03	TOP CMP
5367	6762313.30	1708685.82	6144.37	TOP CMP
5368	6762313.61	1708685.40	6142.44	FL
5369	6762319.72	1708687.39	6142.81	FL
5370	6762326.91	1708682.53	6142.70	FL
5371	6762359.78	1708677.91	6142.73	FL
5372	6762409.38	1708671.75	6143.77	FL
5373	6762461.48	1708659.20	6143.13	FL
5374	6762506.46	1708645.25	6144.32	FL
5375	6762536.22	1708613.84	6144.23	FL
5376	6762551.93	1708592.44	6145.04	FL
5377	6762565.50	1708579.85	6145.08	FL
5378	6762382.31	1708739.12	6142.19	FL
5379	6762379.56	1708741.00	6141.90	FL PIPE
5380	6762379.33	1708741.43	6143.03	TOP PIPE
5381	6762378.17	1708743.40	6142.79	TOP PIPE
5382	6762378.04	1708743.87	6141.65	FL PIPE
5383	6762370.48	1708753.67	6141.95	FL
5384	6762354.27	1708754.09	6142.13	FL CONT
5385	6762362.00	1708763.92	6141.44	FL
5386	6762263.22	1708890.53	6138.38	FL
5387	6762182.43	1708994.80	6136.59	FL
5388	6762137.08	1709056.19	6135.47	FL
5389	6762057.63	1709153.40	6134.49	X
5390	6762060.39	1709155.12	6134.81	TOP
5391	6762062.06	1709156.79	6134.76	TOP
5392	6762063.95	1709158.27	6134.62	X
5393	6762061.45	1709155.91	6133.85	FL
5394	6761944.01	1709310.59	6131.15	FL
5395	6761853.85	1709427.40	6129.39	FL
5396	6761779.09	1709527.34	6127.73	FL

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5397	6761672.77	1709667.16	6125.20	FL
5398	6761538.53	1709844.54	6122.63	FL
5399	6761448.72	1709955.28	6121.50	X
5400	6761450.97	1709956.48	6121.74	TOP
5401	6761452.71	1709958.11	6121.36	TOP
5402	6761454.15	1709959.07	6121.76	X
5403	6761452.20	1709957.14	6120.44	FL
5404	6761395.04	1710031.40	6119.21	FL INT
5405	6761379.58	1710029.83	6119.08	FL CONT
5406	6761386.21	1710043.83	6119.27	FL
5407	6761248.99	1710220.79	6115.89	FL
5408	6761109.57	1710405.35	6112.11	FL
5409	6761005.06	1710540.77	6109.47	FL
5410	6761001.26	1710544.66	6109.40	FL CONT
5411	6761153.73	1710378.60	6113.36	X
5412	6761151.38	1710376.76	6113.44	TOP
5413	6761149.18	1710374.35	6113.39	TOP
5414	6761146.76	1710372.79	6113.47	X
5415	6761150.19	1710376.11	6112.76	FL
5416	6761225.40	1710279.62	6114.78	FL
5417	6761345.17	1710124.62	6117.97	FL
5418	6761478.51	1709947.79	6120.50	FL
5419	6761541.15	1709872.86	6121.91	FL
5420	6761558.50	1709860.78	6122.20	FL INT CONT N
5421	6762337.99	1708728.64	6142.94	FL
5422	6762259.52	1708719.92	6142.84	FL
5423	6762259.19	1708720.08	6144.44	TOP PIPE
5424	6762256.55	1708720.12	6144.54	TOP PIPE
5425	6762255.97	1708720.59	6142.80	FL
5426	6762251.83	1708720.49	6142.91	FL
5427	6762242.90	1708693.77	6142.06	FL INT
5428	6762242.39	1708693.75	6143.79	TOP PIPE
5429	6762239.57	1708694.27	6143.53	TOP PIPE
5430	6762223.94	1708696.52	6142.39	FL
5431	6762142.74	1708700.54	6141.61	FL
5432	6762085.88	1708700.06	6141.54	FL
5433	6762033.43	1708674.26	6141.07	FL
5434	6762032.47	1708675.34	6140.99	FL
5435	6762032.11	1708675.61	6142.41	TOP PIPE
5436	6761996.34	1708612.78	6141.18	FL
5437	6761990.21	1708594.14	6140.68	FL
5438	6761990.19	1708593.85	6142.34	TOP PIPE
5439	6761980.57	1708583.19	6142.03	TOP PIPE
5440	6761979.85	1708583.23	6141.23	FL
5441	6761975.86	1708583.76	6142.31	TOP
5442	6761977.70	1708580.05	6140.54	FL
5443	6761979.57	1708578.90	6142.33	TOP
5444	6761959.41	1708573.69	6140.01	FL GATE

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5445	6761956.43	1708583.49	6140.63	FL GATE
5446	6761958.80	1708573.05	6141.52	TOP PIPE
5447	6761957.64	1708572.99	6142.07	TOP PIPE
5448	6761956.59	1708572.48	6140.23	FL CONT

GROUP H

334	6760412.36	1712612.19	6064.89	CL
335	6760382.49	1712632.19	6064.91	CL
336	6760365.74	1712634.51	6064.66	CL
337	6760361.85	1712646.75	6064.70	CL
338	6760338.56	1712657.81	6064.57	CL
339	6760356.05	1712667.80	6064.44	CL
340	6760351.19	1712683.47	6064.81	CL
341	6760337.60	1712691.26	6064.68	CL
342	6760338.89	1712695.26	6065.11	CL
343	6760357.00	1712695.57	6064.17	CL
344	6760360.24	1712709.10	6064.63	CL
345	6760353.40	1712743.61	6063.60	CL
346	6760352.81	1712760.03	6064.48	CL
347	6760327.98	1712770.17	6064.33	CL
348	6760321.41	1712795.49	6063.83	CL
349	6760271.44	1712834.77	6063.02	CL
350	6760225.44	1712845.09	6062.73	CL
351	6760193.96	1712868.70	6062.31	CL
352	6760180.52	1712909.19	6061.66	CL
353	6760157.63	1712905.48	6061.80	CL
354	6760144.16	1712911.19	6061.57	CL
355	6760145.39	1712948.91	6062.06	CL
356	6760122.01	1712961.71	6060.80	CL
357	6760131.61	1712983.97	6061.25	CL
358	6760125.94	1713017.08	6060.26	CL
359	6760138.36	1713051.31	6060.22	CL
360	6760134.75	1713060.73	6060.36	CL
361	6760105.67	1713109.97	6059.71	CL FRK
362	6760071.25	1713107.49	6060.89	CL
363	6760033.53	1713113.86	6060.11	CL
364	6759999.63	1713122.61	6058.71	CL
365	6759954.68	1713198.74	6058.23	CL
366	6759941.34	1713240.64	6058.69	CL
367	6759959.57	1713262.94	6058.55	CL
368	6759957.89	1713333.07	6056.79	CL
369	6759950.77	1713358.81	6057.03	CL
370	6759909.83	1713353.40	6058.36	CL
371	6759907.35	1713327.09	6058.65	CL
372	6759903.32	1713315.65	6057.02	CL
373	6759867.93	1713332.93	6056.07	CL
374	6759850.58	1713362.27	6056.46	CL
375	6759864.76	1713390.90	6055.84	CL

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376	6759866.02	1713408.50	6055.80	CL
377	6759817.82	1713464.55	6054.53	CL
378	6759768.40	1713505.80	6054.08	CL
379	6759734.19	1713547.64	6054.64	CL
380	6759711.94	1713590.26	6053.64	CL
8413	6759449.19	1713759.87	6053.11	TOP 3FT CMP
8414	6759448.90	1713760.37	6051.69	FL
8415	6759393.13	1713800.80	6051.22	CL
8416	6759376.63	1713800.07	6051.19	CL
8417	6759357.35	1713807.87	6051.17	CL
8418	6759331.20	1713815.80	6051.02	CL
8419	6759280.72	1713860.79	6049.32	CL
8420	6759207.09	1713877.44	6049.19	CL
8421	6759200.01	1713882.42	6048.67	FL 6FT CMP
8422	6759190.83	1713886.82	6058.45	TOP
8423	6759082.95	1713975.17	6048.17	FL 6FT CMP
8424	6759089.78	1713972.35	6057.25	TOP
8429	6759487.49	1713736.72	6054.46	TOP CMP
8430	6759487.16	1713736.32	6052.21	FL
8431	6759498.63	1713725.84	6052.38	CL
8432	6759562.46	1713669.51	6054.35	CL
8433	6759642.53	1713651.11	6055.14	CL
8434	6759660.79	1713620.80	6055.17	CL
8435	6759687.40	1713617.42	6055.63	CL
8436	6759718.43	1713566.85	6055.65	CL
8437	6759755.22	1713521.42	6055.65	CL
GROUP I				
7	6765017.52	1713608.30	6151.21	FL
8	6764966.99	1713608.39	6150.75	FL
9	6764965.23	1713580.12	5150.34	FL
10	6764811.02	1713610.67	6149.74	FL
11	6764812.14	1713580.92	6149.23	FL
12	6764772.92	1713611.16	6148.43	FL HEADS E
13	6764645.91	1713583.74	6142.02	FL
14	6764408.22	1713588.20	6135.18	FL
15	6764232.82	1713591.05	6133.20	FL
5449	6763810.27	1713646.19	6137.01	FL
5450	6763810.42	1713645.26	6138.09	TOP CMP
5451	6763807.54	1713651.27	6137.18	FL
5452	6763731.50	1713691.33	6136.98	FL
5453	6763731.78	1713691.36	6136.90	FL INT PIPE
5454	6763728.60	1713743.00	6135.68	X
5455	6763721.88	1713741.83	6134.68	TOP
5456	6763720.88	1713741.83	6133.45	FL
5457	6763718.81	1713740.60	6134.73	TOP
5458	6763712.72	1713739.60	6136.07	X
5459	6763711.14	1713770.02	6133.58	FL

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5460	6763688.52	1713790.55	6132.96	FL
5461	6763646.60	1713838.78	6132.59	FL INT
5462	6763646.68	1713854.15	6132.44	FL
5463	6763599.86	1713882.49	6131.43	FL
5464	6763590.18	1713901.35	6132.35	TOP
5465	6763586.56	1713897.63	6132.95	TOP
5466	6763587.81	1713899.93	6129.10	FL
5467	6763496.12	1713972.26	6128.85	FL
5468	6763418.88	1714040.13	6126.85	FL
5469	6763383.13	1714073.81	6126.85	FL
5470	6763331.21	1714170.80	6125.13	FL
5471	6763262.36	1714256.93	6123.74	FL
5472	6763213.87	1714333.80	6122.96	FL
5473	6763154.01	1714476.46	6121.32	FL
5474	6763101.16	1714543.49	6120.96	FL
5475	6763047.33	1714639.90	6120.43	FL
5476	6763029.53	1714700.78	6119.39	FL
5477	6763029.53	1714700.94	6120.74	TOP PIPE
5478	6763026.94	1714710.46	6120.59	TOP PIPE
5479	6763026.42	1714711.41	6119.35	FL
5480	6763027.03	1714711.09	6117.35	FL
5481	6762998.24	1714764.17	6117.82	FL
5482	6762999.08	1714764.38	6119.53	TOP
5483	6762995.90	1714761.51	6119.74	TOP
5484	6762955.33	1714801.41	6116.91	FL
5485	6762887.57	1714839.02	6116.30	FL
5486	6762801.39	1714893.63	6115.38	FL
5487	6762741.90	1714926.68	6114.03	FL
5488	6762668.90	1714971.29	6110.95	FL GATE
5489	6762665.51	1714973.43	6114.07	TO PIPE
5490	6763699.53	1714027.21	6127.15	FL TO PIPE
5491	6763699.85	1714028.74	6126.65	TOP
5492	6763703.05	1714030.44	6126.47	TOP
5493	6763706.75	1714012.23	6128.17	FL
5494	6763665.73	1713917.33	6132.48	FL
5495	6763837.32	1713603.58	6138.93	TOP CMP
5496	6763836.81	1713603.29	6137.21	FL
5497	6763842.20	1713585.15	6137.50	FL
5498	6763840.33	1713484.38	6139.02	FL
5499	6763838.32	1713347.92	6143.50	FL
5500	6763841.23	1713243.80	6146.44	FL
5501	6763840.44	1713122.87	6151.20	FL
5502	6763837.87	1712999.30	6154.09	FL
5503	6763845.43	1712868.95	6154.27	FL INT
5504	6763858.94	1712848.19	6154.61	FL
5505	6763839.52	1712768.35	6155.76	FL
5506	6763841.65	1712659.81	6157.31	FL
5507	6763825.40	1712594.59	6160.84	FL TO PIPE

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5508	6763837.37	1712588.99	6160.72	FL
5509	6763848.62	1712586.33	6161.13	FL
5510	6763848.83	1712584.08	6163.14	TOP
5511	6763848.84	1712588.63	6162.71	TOP
5512	6763970.83	1712551.75	6161.87	FL
5513	6764045.59	1712524.56	6162.13	FL
5514	6764130.95	1712478.22	6162.32	FL
5515	6764252.71	1712405.22	6162.76	FL
5516	6764304.76	1712380.53	6163.11	FL
5517	6764313.57	1712377.18	6162.46	FL INT
5518	6764333.97	1712365.63	6163.61	FL
5519	6764317.55	1712394.52	6162.23	FL
5520	6764270.46	1712463.31	6160.79	TOP
5521	6764267.84	1712460.98	6159.65	TOP
5522	6764267.76	1712460.80	6159.92	FL
5523	6764267.26	1712459.51	6160.22	TOP
5524	6764209.83	1712510.35	6157.06	FL
5525	6764121.71	1712572.69	6156.01	FL
5526	6764044.21	1712668.83	6155.28	FL
5527	6763971.97	1712722.56	6156.23	FL
5528	6763910.92	1712794.76	6154.82	FL
5529	6763878.25	1712827.45	6154.41	FL
5530	6763955.40	1712837.25	6152.87	POND
5531	6764011.73	1712785.57	6152.18	POND
5532	6764064.02	1712730.63	6152.76	POND
5533	6764093.32	1712709.90	6151.93	POND
5534	6764125.76	1712689.70	6150.66	POND
5535	6764169.11	1712662.34	6150.99	POND
5536	6764260.31	1712720.54	6151.00	POND
5537	6764277.25	1712798.01	6151.42	POND
5538	6764249.48	1712869.46	6152.46	POND
5539	6764240.54	1712925.81	6152.06	POND
5540	6764239.48	1712944.80	6152.38	POND
5541	6764148.22	1712984.11	6154.45	POND
5542	6764110.16	1712969.96	6152.68	POND
5543	6764040.79	1712941.72	6154.51	POND
5544	6763953.05	1712900.68	6155.12	POND
5688	6765122.30	1713605.12	6152.67	TOP
5689	6765122.38	1713608.73	6152.33	TOP
5690	6765122.16	1713607.40	6151.00	FL
5691	6765122.42	1713603.27	6153.11	EORD
5692	6765122.30	1713583.12	6153.02	EORD
5693	6765045.34	1713606.39	6151.07	FL
5694	6765044.29	1713592.32	6152.94	CL RD
5695	6765016.52	1713593.76	6153.09	CL RD
5696	6764964.67	1713593.91	6152.69	CL RD
5697	6764811.02	1713595.70	6151.65	CL RD
5698	6764771.80	1713602.09	6150.74	CL RD

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5699	6764646.40	1713598.66	6144.13	CL RD
5700	6764407.56	1713601.88	6137.35	CL RD
5701	6764233.03	1713604.92	6135.38	CL RD
GROUP J				
5545	6766462.33	1715237.21	6131.52	POND
5546	6766462.17	1715163.93	6131.33	POND
5547	6766457.66	1715145.15	6130.86	TOP
5548	6766456.85	1715145.32	6130.94	FL
5549	6766453.56	1715145.40	6131.08	TOP
5550	6766441.28	1715151.96	6132.21	POND
5551	6766452.35	1715100.16	6130.48	FL
5552	6766455.37	1714989.98	6132.08	TOP
5553	6766449.63	1714989.96	6132.23	TOP
5554	6766453.97	1714989.74	6131.05	FL
5555	6766451.04	1714951.47	6130.74	FL INT
5556	6766440.07	1714950.58	6130.67	FL
5557	6766450.19	1714946.28	6132.62	TOP PIPE
5558	6766450.77	1714946.75	6130.98	FL
5559	6766447.35	1714930.29	6131.06	FL
5560	6766400.96	1715155.97	6133.08	POND
5561	6766385.54	1715179.01	6132.83	POND
5562	6766388.38	1715213.83	6132.99	POND
5563	6766402.26	1715239.96	6132.67	POND
5564	6766429.74	1715255.28	6132.65	POND
5565	6766449.00	1715255.50	6132.03	POND
5566	6766448.01	1714930.54	6132.66	TOP PIPE
5567	6766442.89	1714925.03	6132.46	TOP PIPE
5568	6766443.06	1714924.92	6130.22	FL
5569	6766448.41	1714917.12	6130.44	FL CONT W
5570	6766427.68	1714925.92	6132.22	TOP PIPE
5571	6766427.54	1714926.36	6130.57	FL
5572	6766412.72	1714948.77	6131.23	FL
5573	6766412.89	1714948.81	6132.18	TOP PIPE
5574	6766290.01	1714958.36	6131.68	X
5575	6766291.11	1714953.97	6131.56	TOP
5576	6766290.49	1714952.48	6130.74	FL
5577	6766290.99	1714948.88	6131.93	TOP
5578	6766290.28	1714933.08	6132.24	TOP
5579	6766289.34	1714926.91	6129.98	FL
5580	6766289.59	1714922.45	6132.08	TOP
5581	6766113.41	1714932.61	6130.34	FL
5582	6766103.77	1714955.20	6129.66	FL
5583	6766103.54	1714955.29	6131.05	TOP PIPE
5584	6766085.80	1714954.77	6131.27	TOP PIPE
5585	6766085.41	1714954.61	6129.81	FL
5586	6765889.59	1714937.21	6129.00	FL
5587	6765889.27	1714959.38	6129.10	FL

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5588	6765783.08	1714940.71	6128.46	FL
5589	6765780.26	1714956.23	6128.28	FL
5590	6765574.33	1714941.04	6127.80	FL
5591	6765574.24	1714938.29	6129.22	TOP
5592	6765574.37	1714943.55	6129.59	TOP
5593	6765571.73	1714969.07	6127.91	TOP
5594	6765572.88	1714974.74	6127.98	TOP
5595	6765573.36	1714972.26	6126.96	FL
5596	6765489.31	1714984.81	6126.53	FL DAY
5597	6765444.72	1714944.15	6126.98	FL
5598	6765434.64	1714946.05	6126.78	FL
5599	6765435.17	1714946.78	6128.45	TOP PIPE
5600	6765431.14	1714965.83	6128.15	TOP PIPE
5601	6765431.39	1714966.68	6126.35	FL
5602	6765424.99	1714989.74	6126.72	TOP
5603	6765430.54	1714990.73	6126.71	TOP
5604	6765428.59	1714988.67	6125.45	FL
5605	6765392.70	1714951.87	6127.12	FL
5606	6765362.56	1714959.09	6127.19	FL
5607	6765268.20	1715020.62	6126.71	FL
5608	6765268.65	1715019.93	6128.73	TOP
5609	6765269.12	1715021.38	6128.78	TOP
5610	6765233.41	1715045.38	6126.64	FL
5611	6765157.88	1715060.65	6126.45	FL
5612	6765087.91	1715052.24	6126.32	FL
5613	6765059.24	1715040.69	6126.47	FL
5614	6765016.67	1714984.20	6126.19	FL
5615	6764983.63	1714951.02	6125.89	FL
5616	6764967.36	1714946.63	6126.36	FL
5617	6764867.92	1714950.83	6125.70	FL
5618	6764783.31	1714955.56	6125.04	FL
5619	6764782.52	1714955.27	6126.84	TOP CMP
5620	6764765.90	1714954.92	6126.90	TOP CMP
5621	6764765.00	1714954.81	6125.02	FL
5622	6764713.35	1714964.37	6125.01	FL
5623	6764698.64	1714977.12	6124.89	FL INT
5624	6764697.09	1714976.99	6125.04	FL
5625	6764696.53	1714976.76	6125.90	TOP PIPE
5626	6764693.59	1714975.99	6125.90	TOP PIPE
5627	6764693.60	1714976.00	6124.55	FL
5628	6764659.10	1714975.15	6124.29	FL
5629	6764636.82	1714960.02	6124.33	FL
5630	6764546.75	1714957.44	6123.60	FL
5631	6764546.40	1714959.45	6125.03	TOP
5632	6764546.28	1714956.37	6124.74	TOP
5633	6764472.45	1714963.06	6124.22	FL
5634	6764441.82	1715042.31	6123.06	FL DAY
5635	6764500.15	1715036.38	6125.95	POND

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5636	6764471.26	1715053.17	6126.77	POND
5637	6764456.84	1715077.91	6126.34	POND
5638	6764452.86	1715117.25	6125.97	POND
5639	6764481.44	1715151.53	6126.47	POND
5640	6764524.89	1715160.40	6127.23	POND
5641	6764549.92	1715164.47	6127.09	POND
5642	6764586.97	1715172.66	6125.09	POND
5643	6764420.79	1715377.07	6124.93	TOP
5644	6764420.08	1715378.35	6123.97	FL
5645	6764417.11	1715380.34	6124.90	TOP
5646	6764405.15	1715361.81	6123.77	FL
5647	6764401.18	1715340.84	6123.05	FL INT
5648	6764397.39	1715342.97	6124.64	TOP PIPE
5649	6764395.11	1715343.86	6123.65	TOP PIPE
5650	6764393.99	1715343.70	6122.37	FL
5651	6764384.98	1715377.10	6121.61	FL
5652	6764375.13	1715487.32	6119.98	FL
5653	6764370.73	1715534.82	6119.23	FL
5654	6764368.97	1715534.27	6120.17	TOP PIPE
5655	6764352.89	1715534.55	6119.69	TOP PIPE
5656	6764352.97	1715534.54	6119.31	FL CONT
5657	6764400.67	1715325.57	6123.28	FL
5658	6764403.89	1715318.28	6123.30	FL
5659	6764404.18	1715318.42	6123.98	TOP
5660	6764402.14	1715316.70	6124.56	TOP
5661	6764444.95	1715272.25	6123.35	FL
5662	6764445.05	1715272.06	6124.74	TOP PIPE
5663	6764456.78	1715261.68	6125.19	TOP PIPE
5664	6764456.88	1715261.16	6123.56	FL
5665	6764507.43	1715223.80	6124.09	FL
5666	6764558.04	1715200.01	6124.23	FL
5667	6764598.15	1715174.98	6124.41	FL
5668	6764612.33	1715130.59	6124.84	FL
5669	6764647.64	1715086.19	6124.54	FL
5670	6764651.15	1715082.33	6124.62	FL
5671	6764654.76	1715084.08	6125.19	FL
5672	6764653.13	1715081.00	6125.24	FL INT
5673	6764650.75	1715082.95	6126.06	TOP PIPE
5674	6764648.72	1715085.51	6126.26	TOP PIPE
5675	6764655.29	1715084.73	6126.06	TOP PIPE
5676	6764663.70	1715090.57	6125.96	TOP PIPE
5677	6764665.18	1715090.97	6124.74	FL
5678	6764681.20	1715114.39	6124.71	FL
5679	6764681.33	1715148.54	6124.37	FL
5680	6764671.87	1715063.37	6125.75	FL
5681	6764691.17	1715011.37	6125.01	FL
5682	6764696.82	1714985.12	6125.00	FL
5683	6765422.29	1715020.94	6126.19	TOP

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5684	6765427.36	1715022.22	6125.93	TOP
5685	6765425.05	1715021.47	6124.48	FL
5686	6765404.96	1715170.06	6122.22	FL
5687	6765379.54	1715363.38	6120.39	FL CONT

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June 2008

SITE PHOTOGRAPHS



Looking south from the northeast corner of Panel 3 North. The 4th East Portal is visible in the distance just right of the fence. Panels 2 North, 3 North, and 1 through 4 West are located between the portal and where this photo was taken. This area is used primarily for irrigated crops and pasture.



Looking northwest over Panels 0 and 1 North, 4 and 6 West, and 2 through 4 North in the distance.



Feature 72. Irrigation Ditch. Looking east.



Feature 73. Pond. Looking southeast.



Feature 74. Irrigation Ditch. Looking south. The ditch is located on the left side of the road and is fed by a culvert running under the road located near where this photo was taken.



Feature 85. Dirt Road and Fences. Looking west.



Feature 90. Ponds. Looking east.



Feature 93. Irrigation Ditches and Farm Land. Looking south.



Feature 93. Irrigation Ditches and Farm Land. Looking southeast. The farmland is located left of the road.



Feature 103. Farm Land, Corrals, Ponds, and Fences. Looking west at irrigated fields along Christiansen Wash.



Feature 103. Farm Land, Corrals, Ponds, and Fences. Looking north at one of the ponds.



Feature 103. Farm Land, Corrals, Ponds, and Fences. Looking southeast at one of the ponds, which was not filled when the survey was performed.



Feature 103. Farm Land, Corrals, Ponds, and Fences. Looking southwest at the fences and corrals.



Feature 107. Corrals and Covered Shelters. Looking south at west portion of corral and covered shelter. (Photo taken April 2007)



Feature 107. Corrals and Covered Shelters. Looking southeast at east portion of corral and covered shelter. (Photo taken April 2007)



Feature 107. Corrals and Covered Shelters. Looking southwest at covered shelter. (Photo taken April 2007)



Feature 107. Corrals and Covered Shelters. Looking east along northern edge of corral. (Photo taken April 2007)



Feature 107. Corrals and Covered Shelters. Looking southwest at marshy, grassy area below and south of the corral and covered shelters. (Photo taken April 2007)



Feature 108. Corral. Looking southeast.



Feature 108. Corral. Looking south.



Feature 109. Farm Land. Looking east.



Feature 109. Farm Land. Looking northeast.



Feature 110. Corrals, Sheds, Barn, Pond, and Farm Land. Looking east at barn.



Feature 110. Corrals, Sheds, Barn, Pond, and Farm Land. Looking west at barn.



Feature 110. Corrals, Sheds, Barn, Pond, and Farm Land. Looking west-southwest at foundation of barn.



Feature 110. Corrals, Sheds, Barn, Pond, and Farm Land. Looking south at pond and barn.



Feature 110. Corrals, Sheds, Barn, Pond, and Farm Land. Looking west across pond at corrals.



Feature 110. Corrals, Sheds, Barn, Pond, and Farm Land. Looking west at pond, corral, and shed.



Feature 110. Corrals, Sheds, Barn, Pond, and Farm Land. Looking southeast at corrals, shed, and farmland.



Feature 111. Road, Utility Power Lines, Telephone Lines, and Fence Lines. Looking north along the road. The barn in Feature 110 is visible in the right of the photo.



Feature 111. Road, Utility Power Lines, Telephone Lines, and Fence Lines. Looking south along the road. The barn in Feature 110 is visible in the center-left of the photo.



Feature 111. Road, Utility Power Lines, Telephone Lines, and Fence Lines. Looking northeast at a buried fiber optic cable manhole located below the power lines. Feature 113 is visible in the background.



Feature 112. Corral. Looking west. The hay derrick is visible in the background.



Feature 112. Corral. Looking southeast at empty pond located east of corral.



Feature 112. Corral. Looking north at corral, shelter, hay derrick, and empty pond (in foreground).



Feature 113. Corral. Looking southwest.



Feature 114. Corrals. Looking west. The corrals are in the distance. They were not directly accessible during the Spring 2008 survey due to the presence of livestock.



Feature 118. Section Corner Marker.



Feature 124. Shed. Looking west.



Feature 124. Shed. Looking southwest along side of shed at crusher.



Feature 124. Shed. Looking east.



Feature 125. Water Line Manhole with Emergency Shutoff Valve. Looking south.



Feature 125. Water Line Manhole with Emergency Shutoff Valve. View into manhole looking at emergency shutoff valve.

CHAPTER VIII VEGETATION

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VIII-1	VEGETATION & LAND USE MAP
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Revised 05/2007

Revised 11/08

BIOLOGICAL RESOURCES
of the
FULL EXTRACTION PILLAR SPLITTING,
LIFE OF MINE SURFACE AREA

at the
EMERY MINE SITE

for
CONSOLEENERGY



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November 2008



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INTRODUCTION

Consolidation Coal Company (Consol) has plans to expand their underground coal mining operations to other areas of the Emery Mine. Because full extraction mining methods will be employed, some subsidence on the ground surface is anticipated.

Vegetation maps have been prepared and submitted to the State of Utah, Division of Oil, Gas & Mining (DOGM) with previous submittals from Consol. This document has been prepared to address some of the biological resources above underground mine areas that could potentially be impacted by the full extraction pillar splitting methods that have been proposed for the life of the Emery Mine.

METHODS

Biological studies and field work had been conducted over the past few years within Emery Mine's permit area including recording of data, surveying for potential sensitive species and their habitats, and plant community mapping. This document reports new as well as previous information to address the surface areas above the full extraction pillar splitting, life of mine areas.

Most of the color photographs of the plant communities in this report were taken above the

proposed full extraction mining activities, but a few were used from a comparable community that were located just outside the full extraction areas.

Vegetation mapping was accomplished by using aerial photographs and onsite field mapping techniques. Wildlife habitat information was obtained by using the State of Utah, Division of Wildlife Resources (DWR) geographic information system (GIS) data base and maps.

Several field studies have been done previously during the appropriate season for threatened and endangered species in the permit area. Threatened, endangered and candidate species lists were compiled beforehand by conferring with U.S. Fish & Wildlife Service, Salt Lake City, Utah , reviewing files located at *Mt. Nebo Scientific, Inc.*, Springville, Utah, and by examining voucher specimens at the herbarium at Brigham Young University.

RESULTS

PLANT COMMUNITIES

Listed below are the plant communities that occur at the land surface above the full extraction mine areas. A brief description of these communities have also been included. For a vegetation map of this area refer to Emery Mine's Mining & Reclamation Plan (MRP), Vegetation and Landuse Map, Plate VIII-1.

Greasewood

Greasewood communities were common in the study area (Figure 1). This community is known for its relatively low species diversity with the dominant plant species here represented almost exclusively by greasewood (*Sarcobatus vermiculatus*) and to a lesser extent, Torrey's seepweed (*Suaeda torreyana*).

Pasture Lands

Some of the lower elevation areas have been converted from native plant communities to pasture lands for use by domestic livestock. Some of the pasture lands are irrigated by land owners (Figure 2), while others have been irrigated in the past, but are currently being utilized as unirrigated, dry-land pastures (Figure 3). Differentiation between the two has been delineated on the vegetation maps previously submitted for the permit area.

Riparian Shrublands

Riparian Shrublands is a general name for plant communities in the area adjacent to the streams and drainages in the study areas (Figure 4). The amount of water in the drainages and their flow rates are variable and depending on the specific reach or time of year, can range from bankfull to almost non-existent.

Woody plants present in these areas include species such as tamarisk (*Tamarisk chinensis*), willows (*Salix* spp.), Russian olive (*Elaeagnus angustifolia*), greasewood (*Sarcobatus vermiculatus*), sagebrush (*Artemisia tridentata*) and cottonwoods (*Populus* spp.), as well as a host of upland and wetland grasses and forb species.

Unlike most other plant communities described in this report, the Riparian Shrublands were located within "stream buffer zones" (see Emery Mine MRP, Subsidence Monitoring Points and Buffer Zones, Plate V-5) and will not be fully extracted by mining activities.

Consequently, no subsidence will occur in these areas.

Russian Olive

Russian olive trees, a native of Europe and often an undesirable invader to Utah, have become established in some relatively large portions of the study areas such as drainages and moist meadows (Figure 5). Their invasion may be due in-part to past and present irrigation practices that have somewhat altered the natural conditions for ground and surface water flows in these areas. Other species were also common here, especially saltgrass (*Distichlis spicatus*) and wiregrass (*Juncus arcticus*).

Saltgrass

The lower elevation topography of the study areas were often comprised of Saltgrass plant communities (Figure 6). The water that flows within these areas is often derived from natural groundwater and surface water as well as runoff from irrigated pasture lands located up-gradient. The dominant species in these communities was often almost exclusively comprised of saltgrass. However, there were other saltgrass areas that were comprised of additional species that were represented as co-dominants such as tamarisk, Russian olive and wiregrass; these communities were separated on the vegetation maps and have been described separately in this report.

Shadscale

A Shadscale plant community occupied portions of the study areas (Figure 7). As the community name suggests, this community was dominated by shadscale (*Atriplex confertifolia*), but several other species of shrubs, forbs, and grasses were often common in this community such as broom snakeweed (*Gutierrezia sarothrae*), mat saltbush (*Atriplex corrugata*), Cryptantha (*Cryptantha* spp.), Indian ricegrass (*Stipa hymenoides*), galleta (*Hilaria jamesii*) and blue grama (*Bouteloua gracilis*).

Tamarisk

Tamarisk, or salt cedar, is a non-native plant that has become a problem in Utah because it out-competes and often displaces other native riparian species. A native of Eurasia, it was once cultivated as an ornamental and has become naturalized along seeps, streams, and reservoirs in Utah. Nearly pure stands of tamarisk have become established in some locations of the permit area (Figure 8). These locations were often in the more moist areas where previous land disturbances have impacted the native plant communities (i.e. removal of native species to increase pasture land).

Wiregrass/Saltgrass

Located in drainages and meadows of the study areas was a community called Wiregrass/Saltgrass (Figure 9). Depending on the specific area, either wiregrass or saltgrass was the dominant plant species. In other areas, each of these species could be represented almost exclusive of all other species.

Threatened and Endangered Plant Species

There are several federally listed plant species that are known to occur in Emery County, Utah (Table 1). It is unlikely but possible, that some of these species may occur in the study areas. The most likely plant communities for such occurrences would be the aforementioned shadscale communities. A sensitive species field survey will be conducted in the full extraction pillar splitting areas in the growing season of 2009. The time period when these species will be surveyed will be chosen according to the individual species and according to the plant's phenology to insure that, if present, observation and identification of the species will be enhanced. Timing for the surveys should be in the spring ranging from April through June.

**Table 1: Federally Listed Threatened or Endangered Plant Species
in Emery County, Utah**

Scientific Name	Common Name	Status
<i>Cycladenia humilis</i> var. <i>jonesii</i>	Jones Cycladenia	T
<i>Erigeron maguirei</i>	Maguire Daisy	T
<i>Pediocactus despainii</i>	Despain Footcactus	E
<i>Pediocactus winkleri</i>	Winkler Footcactus	T
<i>Schoenocrambe barnebyi</i>	Barneby's schoenocrambe	E
<i>Sclerocactus wrightiae</i>	Wright Fishhook Cactus	E
<i>Townsendia aprica</i>	Last Chance Townsendia	T

E = Endangered

T = Threatened

WILDLIFE

Wildlife habitat information has been compiled previously for the Emery Mine area.

Moreover, DWR GIS information databases have been consulted. A wildlife map for the entire permit area has been prepared previously and has been included in Emery Mine's Mining & Reclamation Plan (MRP). A map called Selected Wildlife Information (Plate 10-1) shows this information. This map includes the full extraction pillar splitting area.

Federally listed threatened, endangered and candidate species for Emery County are shown on Table 2. Of these species, little or no habitat is present within the mine's permit area. Table 2 also briefly describes the habitat for each of these species and the potential impacts, if any, as a result of the full extraction pillar splitting mining planned by the Emery Mine.

Although federally listed threatened, endangered and candidate wildlife species are probably not present within the permit boundaries of the Emery Mine, two sensitive species may be present including burrowing owls (*Athene cunicularia*) and white-tailed prairie-dogs (*Cynomys leucurus*). Habitat for these species will be surveyed in the full extraction areas. If prairie dog burrows are present, surveys will be conducted to determine whether or not the burrows are active. This field work will be conducted in 2009 during the animals most active periods from late spring to early summer.

**Table 2: Federally Listed Threatened, Endangered and Candidate Wildlife Species
in Emery County, Utah**

Scientific Name	Common Name	Status	Comments
<i>Coccyzus americanus occidentalis</i>	Western Yellow-billed Cuckoo	C	<p>DWR database information states that historically, cuckoos were probably common to uncommon summer residents in Utah and across the Great Basin. The current distribution of yellow-billed cuckoos in Utah is poorly understood, though they appear to be an extremely rare breeder in lowland riparian habitats statewide. DWR information also states that currently, the range of the cuckoo is limited to disjunct fragments of riparian habitats from northern Utah, western Colorado, southwestern Wyoming, and southeastern Idaho southward into northwestern Mexico and westward into southern Nevada and California.</p> <p>Although the possibility existed that the species could be seen in Emery County, it is highly unlikely that it occurs within the Emery Mine permit area due to the limited habitat for this species.</p> <p>There should be no impacts to this species as a result full extraction mining in the study area.</p>
<i>Empidonax traillii eximius</i>	Southwestern Willow Flycatcher	E	<p>This species breeds in southwestern U.S. and winters in southern Mexico and Central America. It is a rare visitor of southern Utah. Its habitat is primarily riparian and the bird most frequently occurs in dense willow stands.</p> <p>There are few dense willow stands in the Emery Mine permit area.</p> <p>There should be no impacts to this species as a result full extraction mining in the study area.</p>
<i>Gila cypha</i>	Humpback Chub	E	<p>Humpback chub in Utah are now confined to a few white-water areas in the Colorado, Green, and White Rivers. These rivers do not occur in the Emery Mine permit area. Other than some subsidence from underground mining, no surface disturbances that could impact downstream drainage to the Colorado River system have been planned in the full extraction areas.</p> <p>There should be no impacts to this species as a result full extraction mining in the study area.</p>
<i>Gilia elegans</i>	Bonytail	E	<p>The bonytail is a very rare minnow originally native to the Colorado River system. These rivers do not occur in the Emery Mine permit area. Other than some subsidence from underground mining, no surface disturbances that could impact downstream drainage to the Colorado River system have been planned in the full extraction areas.</p> <p>There should be no impacts to this species as a result full extraction mining in the study area.</p>
<i>Lynx canadensis</i>	Canada Lynx	T	<p>Lynx usually occur in mature forests having dense undergrowth. They can also be found in more open forests, rocky areas or tundra.</p> <p>This habitat is not found within the Emery Mine permit area.</p> <p>There should be no impacts to this species as a result full extraction mining in the study area.</p>

**Table 2: Federally Listed Threatened, Endangered and Candidate Wildlife Species
in Emery County, Utah**

Scientific Name	Common Name	Status	Comments
<i>Mustela nigripes</i>	Black-footed Ferret	Ex	<p>Black-footed ferret habitat is primarily prairie grasslands. The ferret has a diet consisting of almost 90% prairie dogs. Although prairie dog habitat does occur in the permit area, it is not prairie grassland. DWR information suggested that this species has been "extirpated" from Emery County.</p> <p>No ferrets have been reported during prairie dog surveys within the permit area. However, future prairie dog surveys conducted will also report ferret activity if observed.</p> <p>There should be no impacts to this species as a result full extraction mining in the study area.</p>
<i>Ptychocheilus lucius</i>	Colorado Pike minnow	E	<p>The Colorado pikeminnow is a fish that prefers medium to large rivers. With the loss of habitat they are now restricted to the upper Colorado River system. These rivers do not occur in the Emery Mine permit area. Other than some subsidence from underground mining, no surface disturbances that could impact downstream drainage to the Colorado River system have been planned in the full extraction areas.</p> <p>There should be no impacts to this species as a result full extraction mining in the study area.</p>
<i>Strix occidentalis lucida</i>	Mexican Spotted Owl	T	<p>In Utah the Mexican spotted owl is rare, but when it occurs it is sometimes in various forest types, but more commonly in steep rocky canyons, nesting in caves or cliffs of steep walled canyons. This habitat does not exist in the mine area with the possible exception of the Miller Canyon area. DWR distribution maps do not show the owl in the mine area.</p> <p>There should be no impacts to this species as a result full extraction mining in the study area.</p>
<i>Xyrauchen texanus</i>	Razorback Sucker	E	<p>This species prefers slow backwater habitats and impoundments in the Colorado River system. Utah Division of Wildlife Resources distribution maps of this species for Carbon County shows to occur near the Green River in extreme eastern portion of the county. These rivers do not occur in the Emery Mine permit area. Other than some subsidence from underground mining, no surface disturbances that could impact downstream drainage to the Colorado River system have been planned in the full extraction areas.</p> <p>There should be no impacts to this species as a result full extraction mining in the study area.</p>
<p>E = Endangered T = Threatened C = Candidate Ex = Extirpated</p>			

SUMMARY

Full extraction pillar splitting, life of mine plans have been proposed for the Emery Mine. Within the boundaries of this mining area, the plant communities, wildlife habitats, threatened, endangered and sensitive species have been addressed in this report. Prior to mining, additional surveys will be conducted for threatened and endangered plant species shown in Table 1 as well as two sensitive wildlife species, namely the white-tailed prairie-dog and the burrowing owl.

COLOR PHOTOGRAPHS
of the
PLANT COMMUNITIES

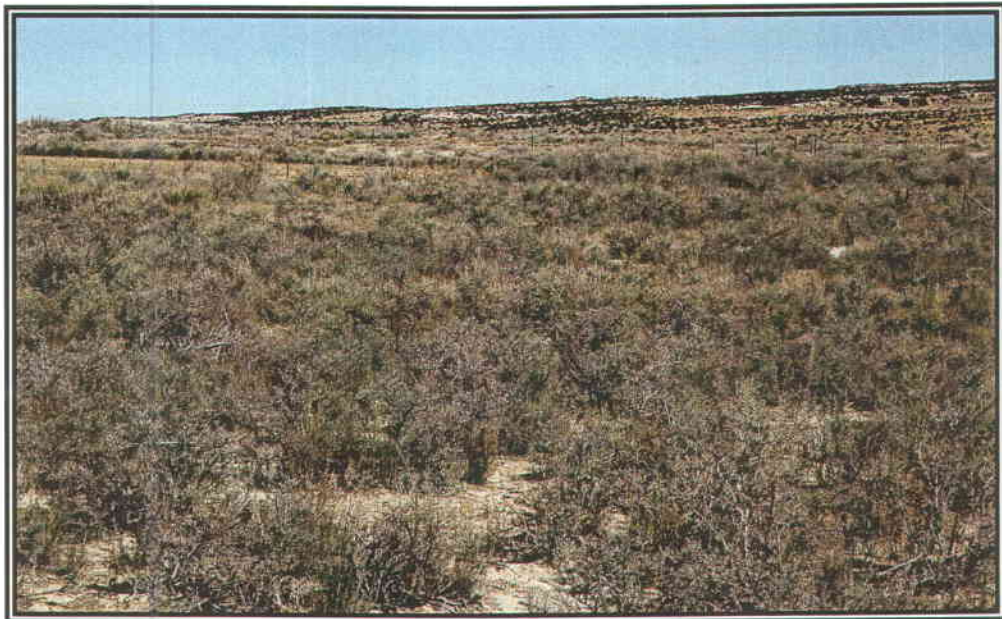


Figure 1: Greasewood

(photo by P. Collins)



Figure 2: Pasture Land (irrigated)

(photo by R. Hardy)

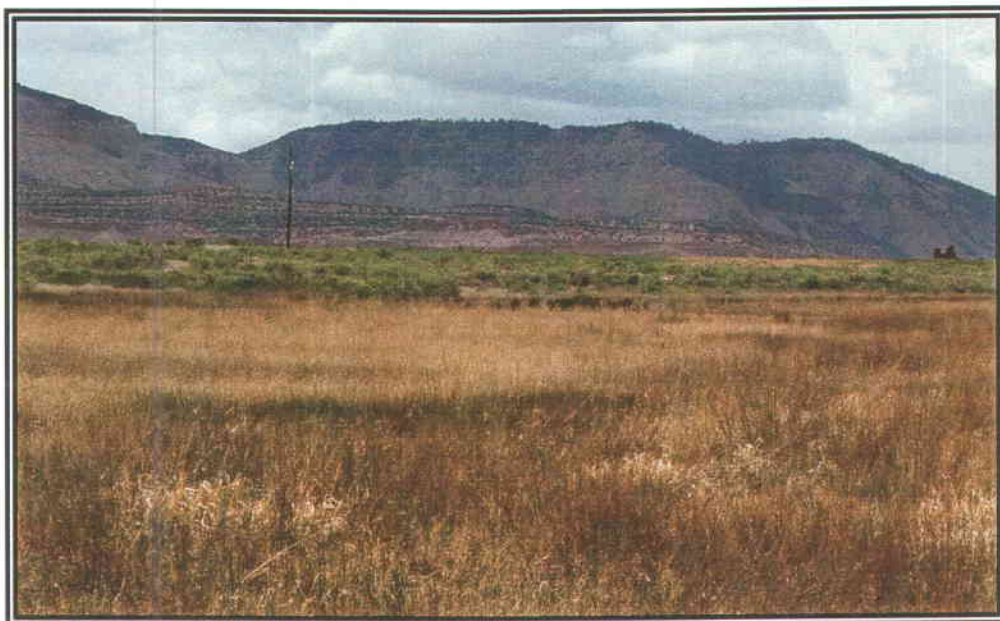


Figure 3: Pasture Land (unirrigated)

(photo by P. Collins)



Figure 4: Riparian Shrublands (buffer zone; no subsidence area; see text).

(photo by R. Hardy)



Figure 5: Russian Olive

(photo by R. Hardy)

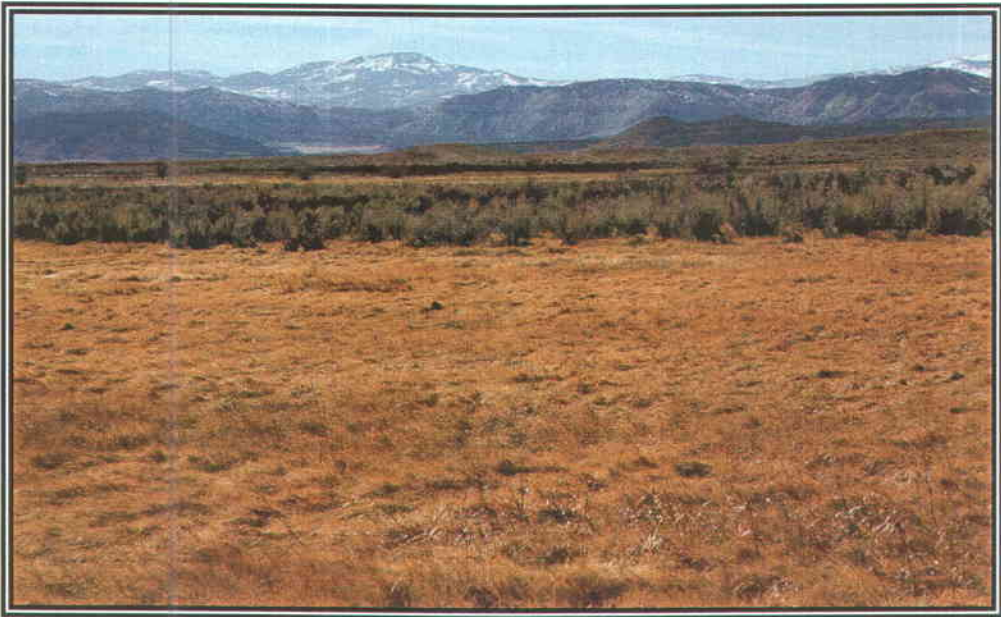


Figure 6: Saltgrass

(photo by P. Collins)



Figure 7: Shadscale

(photo by P. Collins)



Figure 8: Tamarisk

(photo by P. Collins)



Figure 9: Wiregrass/Saltgrass (foreground)

(photo by P. Collins)

CHAPTER X

PART A: CULTURAL RESOURCES

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